CLAIMS

1. A continuous contacting apparatus for separating a liquid component from a liquid mixture, the apparatus comprising:

an evaporation chamber having first and second ends, an inlet and an outlet for a carrier gas, and an inlet and an outlet for a liquid mixture, wherein the inlet for the liquid mixture and the outlet of the carrier gas are located on the first end of the evaporation chamber;

a dew-formation chamber having an inlet and an outlet for a carrier gas, and an outlet for the separable liquid component, wherein the inlet for the carrier gas of the dew-formation chamber is situated in a countercurrent manner to the inlet for the carrier gas of the evaporation chamber; and

a common heat transfer wall capable of providing thermal communication between the evaporation chamber and the dew-formation chamber.

2. The apparatus according to claim 1 further comprising,

a feeding device for providing the liquid mixture onto the evaporation side of said heat transfer wall;

an air mover for providing a flow of a carrier gas through the chambers, wherein the gas flow in the evaporation chamber is countercurrent to the gas flow in the dew-formation chamber; and

a heating apparatus for heating the carrier gas from the outlet of the evaporation chamber, wherein the heated carrier gas is directed to flow into the inlet of the dew-formation chamber.

3. The apparatus according to claim 1, wherein the apparatus provides a condensate production flux from about 0.045 to about 2.27 kg of condensate per hour/m^2 of heat transfer wall.

4. The apparatus according to claim 1, further comprising a wetting material placed on the evaporation side of the heat transfer wall.

5. The apparatus according to claim 1, wherein the heating apparatus is a boiler, which provides steam to the carrier gas.

6. The apparatus according to claim 1, wherein the heating apparatus is a heat exchanger, wherein steam from a boiler is brought into thermal communication with the carrier gas.

7. The apparatus according to claim 1, wherein the heating apparatus is a desiccant/heat exchanger, wherein a slip stream is taken from the carrier gas and reacted with a desiccant and the heat produced by the reaction is thermally communicated to the remainder of the carrier gas.

8. The apparatus according to claim 7, wherein the desiccant is selected from the group consisting of lithium bromide, calcium chloride, lithium chloride, and mixtures thereof.

9. The apparatus according to claim 1, wherein the heating apparatus is a liquid contactor, wherein a reactant reacts with the carrier gas, thereby increasing the concentration of the water vapor in the remaining carrier gas.

10. The apparatus according to claim 9, wherein the carrier gas and reactant are respectively selected from the group consisting of carbon dioxide carrier gas and potassium carbonate reactant; carbon dioxide carrier gas and monoethanol amine reactant; butane carrier gas and oil reactant; sulfur dioxide carrier gas and monoethanol amine reactant; and carbon monoxide carrier gas and copper ammonia acetate reactant.

11. The apparatus according to claim 1, further comprising a plurality of spacers placed in each chamber.

12. The apparatus according to claim 11, wherein the plurality of spacers are positioned to provide a serpentine-shaped channel for the carrier gas.

13. The apparatus according to claim 12 further comprising airflow guides.

14. The apparatus according to claim 1, wherein one or more of the chambers further comprises a filler.

15. The apparatus according to claim 1, wherein the liquid mixture further comprises an anti-gellant or an anti-flocculant.

16. The apparatus according to claim 15, wherein the anti-gellant or anti-flocculant is selected from the group consisting of polyvinyl alcohol, carboxymethyl cellulose, and mixtures thereof.

17. A process for separating a liquid component from a liquid mixture in a continuous contacting manner, the process comprising:

providing a heat transfer wall having an evaporation side and a dew-formation side;

contacting the liquid mixture with the evaporation side of the heat transfer wall;

flowing a carrier gas across the evaporation side of the heat transfer wall to provide a carrier gas saturated with the separable liquid component;

heating the saturated carrier gas; and

flowing the heated saturated carrier gas across the dew-formation side of the heat transfer wall to provide condensation of the separable liquid component from the heated saturated carrier gas.

18. The process according to claim 17, wherein the flow of the carrier gas across the evaporation side of the heat transfer wall is countercurrent to the flow of the carrier gas across the dew-formation side of the heat transfer wall.

19. The process according to claim 17, wherein the condensate production flux is from about 0.045 to about 2.27 kg of condensate per hour/m^2 of heat transfer wall.

20. The process according to claim 17, wherein the evaporation side of the heat transfer wall further comprises a wetting material placed on the wall.

21. The process according to claim 17, wherein the saturated gas is heated by a method selected from the group consisting of adding steam; gas-liquid contacting with a hot water stream; heat exchanging with a higher temperature stream; heat exchanging with a slip carrier gas stream that is brought into contact with a desiccant; and reacting the carrier gas with a reactant.

22. The process according to claim 17 further comprising adding an anti-gellant or an anti-flocculant to said liquid mixture before contacting the liquid mixture with the evaporation side of the heat transfer wall.

23. The process according to claim 17, wherein said anti-gellant or anti-flocculant is selected from the group consisting of polyvinyl alcohol, carboxymethyl cellulose, and mixtures thereof.